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SEPTEMBER, 1938 VOLUME XV, NO. 6

THE CHEMIST IN THE SUGAR INDUSTRY

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The CHEMIST

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THE AMERICAN INSTITUTE OF CHEMISTS
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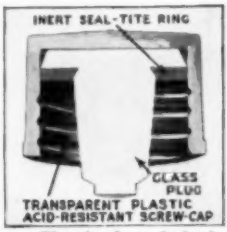

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Our Professional Organization

By **Robert J. Moore,**

***President,* The American Institute of Chemists**

THE AMERICAN INSTITUTE OF CHEMISTS is not a scientific organization in the sense of promoting the welfare of the science through discussional meetings and scientific publications. That is the field of the American Chemical Society and ably does it fulfill its purpose.

The INSTITUTE is the watch dog of the *professional* interests of the chemist. It speaks for the welfare and progress of the chemist to the public, the employer and the state. Its problems and concerns are: The business and technical ethics of the chemist; the recognition of adequate training courses and experience in practice leading to the awarding of professional membership; the study of contracts; the concern over legislation or licensing laws which might adversely affect its membership; and finally, the maintenance of a firm but dignified morale along a united front.

Today, more than ever since its incorporation fifteen years ago, these aims are needed. And today, with rapidly growing appeal to the leaders in our profession, we are in a position to maintain strong influence.

One of the most annoying problems of the day is that of unionization, with labor leaders attempting to bring every type of employee group into some form of union, using either political or official pressure. To guard against this attempt to submerge our profession in an engulfing sea of unionization, we must speak to the young chemist not only with advice and counsel but with group support. Chemistry is not a trade. The chemist is not a laborer, mechanic or artisan. The trade or labor union does not apply. It is the INSTITUTE OF CHEMISTS that must now step forward to fill this breach.

The INSTITUTE meets this question with activities extending back over ten years. Adequate recognition of chemists with respect to salaries and contracts, the reclassification of large groups, especially in city and governmental departments, from labor categories to new professional classes; the protection of the term "chemist" from inroads by drug clerks, laboratory helpers, or others who have had inadequate training and experience. This is part of the INSTITUTE'S most important function, not only in defending the professional chemist but in

protecting the public and the employer as well. It may lead finally to a licensing system for adequately trained chemists similar to licenses for the practice of engineering, medicine, or law. The charlatan and the untrained must not be recognized as "chemist".

Further activities toward meeting the union thrust are provided in the INSTITUTE'S recognition of the unemployed chemist. Through the Chemists' Advisory Council, the unemployed chemist is made truly aware that he is a member of a profession. He is given counsel and advice regarding possible openings and the preparation required for each. He is given some degree of economic help from his employed brethren and through this sympathetic guidance is maintained a morale commensurate with the dignity of the profession.

Regarding the relationship of the INSTITUTE to the American Chemical Society, let us quote one of the charter members of the latter society, Professor Charles E. Munroe of Washington:

"The founders of THE AMERICAN INSTITUTE OF CHEMISTS recognized that as the practice of chemistry spread a need was created for an organization which should represent and promote the profession of chemistry, as the bar and medical association in various countries represent and promote the interests of the practitioners of law and medicine, while protecting the community by the formulation and proclamation of standards governing practice, procedure, and professional conduct, and by certification of professional qualifications. The avowed purpose in the creation of the American Chemical Society was "the encouragement and advancement of chemistry in all its branches", and its record testifies that it has most admirably fulfilled the purpose for which it was created, but from the very nature of its organization it is unsuited to perform the functions for which the INSTITUTE was created and moreover these are wholly foreign to the purpose for which the American Chemical Society was created. Fortunately, these two organizations occupy quite independent fields, complementing one another to the better advancement of chemistry and the chemist and to the better advantage of mankind whom both serve."*

THE AMERICAN INSTITUTE OF CHEMISTS is proud of its record since its founding in 1923. It has grown in influence and regard under the distinguished leadership of its presidents, Horace G. Byers, M. L. Crossley, Treat B. Johnson, Frederick E. Breithut, Henry G. Knight and Maximilian Toch. We face the future as an organization of professional men with responsibility, dignity, and a determined purpose.

(*Science LXII, No. 1606, 313 (1925))

The Chemist in the Sugar Industry

By F. W. Zerban, F.A.I.C.

ACCEPTING the housewife's definition of sugar, this discussion will be confined to the part played by the chemist in the direct production of sucrose from plants and will leave out of consideration those chemists who are interested primarily in its nature, structure, and possible synthesis, without underestimating the splendid services that many of these men have rendered to the industry.

The sugar industry is a unique combination of agriculture and manufacture, and is in some respects quite different from other branches of chemical industry. The sugar is actually manufactured in the growing plant from carbon dioxide and water. After it reaches the factory as a constituent of cane, beet, or other plant, the processes employed, unlike those in many other chemical industries, do not aim to cause but rather aim to avoid chemical change in the sugar itself, to free it of accompanying impurities and to turn it out in the crystalline state with as little loss as possible.

In both divisions of sugar production, the agricultural as well as the manufacturing, the chemist plays an important part, and the wide field thus presented to him offers unusual opportunities for varied applications of his knowledge of chemistry and other related sciences. The agricultural operations must be guided so that a maximum yield of sugar per acre-year is obtained at minimum cost; at the same time the sap must be of such quality that the maximum amount of sugar of the desired grade may be extracted in the factory, again at minimum expense.

The principal factors governing the yield of sugar in the field are climate, soil, varieties of cane or beet plants, fertilizers, cultural practices, and destructive insects or other pests. With some of these the chemist is concerned only indirectly, but soils and fertilizers are his particular domain. In many countries the chemist has been and is rendering invaluable services to the sugar industry by mapping soils from the standpoint of sugar production. The chemists of the Hawaiian Sugar Experiment Station have developed a system of rapid soil tests which can be applied right in the field to serve as a guide for the choice of soils and fertilizers. Another system, based on a somewhat different principle, is used in Sweden and in Java. The importance of soil studies may be illustrated by a case from my own experience. About twenty-five years ago certain areas on the north coast of Puerto Rico

had been planted to cane without previous investigation. It was low-lying land that had only recently been drained. In some areas the cane grew fairly well, but in others it was badly stunted. Chemical examination showed that the trouble was due to excessive quantities of soluble salts in the soil solution, and that not only the total quantity of salts, but the relative proportions of different salts had an important effect, some of them being antagonistic to others. These findings suggested proper remedies to be applied. Similar soil studies in the Florida Everglades have led to greatly increased sugar production there by the use of soil ameliorants. This leads us to the broad subject of fertilizers for the growing of cane or beets. Here the chemist may help by studying the effect of nutrient salts on the yield of sugar, by pot or field experiments not only with the well-known plant food elements, but also with some of the rarer soil constituents, such as copper, manganese, etc., which have been found to stimulate plant growth on certain soils when applied in very small amounts, and have in some cases made sugar production possible where without them it had proved to be an economic failure. The chemist's help is also required to interpret the results of field experiments on varieties and cultural practices; to determine the damage done by insects and diseases; to follow the growth of the cane or beet, and to fix the best time of harvesting by analyses at regular intervals. In addition to such investigational activities, the chemist should analyze fertilizers and other agricultural supplies to see that they come up to specifications. The analysis of irrigation water is important in some districts. Examination of beet seed for moisture, foreign seed, other impurities, and germination power is also the duty of the chemist.

The work of the chemist in connection with the agricultural side of the industry has been particularly stressed because in many places or countries the large potential producing capacity of the cane or beet has been utilized to only a small extent. While the possibility of increasing sugar production in the field is fully realized in some of the more progressive beet and cane areas, much remains to be done in others.

Much more emphasis has usually been placed on increasing the sugar extraction in the factory, and there is only a small margin for improvement here, compared to what may yet be done in the field.

The foremost duty of the chemist in the factory is to account for every pound of sugar that enters. This might be considered as merely a book-keeping job, but it is much more than that if the real purpose of the book-keeping is constantly kept in mind. This purpose is to see

that the highest possible percentage of the sugar received from the field is put into the sugar bag, and to keep the avoidable losses at a minimum figure. This places on the chemist the responsibility to detect any losses that may occur; trace them to their source; apply appropriate remedies, and to guard against such losses in the future. The tracing of losses frequently taxes the ingenuity of the chemist, as was pointed out in an address by Mr. Baëza some years ago. He also showed that many problems arise in sugar factory operation which the chemist is called upon to solve, always with the ultimate aim of cutting costs. The time factor is usually very important in this connection. The sooner losses are detected, the sooner can they be corrected and greater losses avoided. This makes it necessary for the control chemist to devise speedy analytical methods, without sacrificing the required accuracy. Other important duties of the factory chemist are the analyses of fuel, limestone, lime, and other raw materials used in sugar manufacture; of flue gases, and supervision of the water purification plant.

Improvements in the profitable utilization of by-products are a fruitful field of investigation for the chemist. A typical example of accomplishment along this line of endeavor is the manufacture of Celotex, an insulating wall board, from the fibrous residue of the cane plant, which was previously used only for fuel. Alpha-cellulose has recently been produced on an experimental factory scale from the same raw material. Various grades of paper have been made from it, but the processes used have not proved economical. From low grade beet molasses the chemist has produced raffinose, betaine, asparagine, glutamine and many other chemicals, but none of these are in sufficient demand to warrant manufacture on a large scale. During the world war, potash salts, then high in price, were made from molasses. Much has been said and written about the utilization of sugar itself for other than food purposes, but little real progress has been made in this direction. These few examples will suffice to show, however, that here is a fascinating challenge for the chemist. I shall not dwell on the fermentation products of sugar, because this phase belongs to our cousin, the bacteriologist.

What has been said about the operation and control of the factory that turns out sugar from the cane or beet on the spot applies equally to the sugar refinery, the only difference being that in the latter case the raw material is unrefined sugar instead of a field crop and that some other purifying agents are used.

This brief outline of the duties and opportunities of the chemist in

the sugar industry shows that he must have a broad and thorough training. Although his principal tool is chemistry, and the related sciences of physics and mathematics, he should also have a well-rounded knowledge of the growing of the cane or beet, or preferably both. He should also be well equipped in chemical engineering. Although the purely mechanical phases of sugar manufacture are usually handled by an engineer, the chemist should have a thorough understanding of all the unit processes used in sugar manufacture, and be well acquainted with fuel technology and the uses of steam and electricity. A thorough knowledge of English is indispensable so that he may be able to write clear and intelligible reports. If the chemist wishes to work in foreign lands, he should also acquire a working knowledge of the language of the particular country. In Latin America and the West Indian Islands, which frequently draw on Americans for chemical services, Spanish and in some instances Portuguese or French are needed. The sugar chemist should be able to read the technical literature appearing in French or German, and possibly also Dutch or Russian. A knowledge of economics is also very helpful, especially if the chemist aspires to a place at the top.

The fundamental training for the sugar chemist is best obtained in a college that offers strong courses not only in the sciences, but also in agriculture and chemical engineering. There are a number of schools, scattered over the world, which specialize in the training of sugar technologists, either by offering complete courses, or by supplementing courses taken in other schools or colleges. One of the best known of these special institutions is the Audubon Sugar School, formerly located at New Orleans, and now at Baton Rouge, Louisiana. During its nearly fifty years of existence it has sent out a large number of graduates many of whom have become leaders in the cane sugar industry in foreign lands. Similar schools have been established in Europe and in some tropical countries also. There are in addition a number of research institutes and experiment stations specializing in sugar, maintained in some cases by the government, in others by associations of sugar planters or sugar manufacturers and refiners. They offer a fine opportunity for young graduates to get additional training and to do research work.

In most cases, however, the young graduate seeks a position in a factory where he is usually placed first in the control laboratory as assistant. From this he works up into the higher positions, the next step being that of chief chemist who is responsible for the conduct of

the laboratory and for the control reports. It is advisable for the young chemist to spend as much of his free time as possible in the plant, in order to become acquainted with factory operation in all its phases. This gives him a chance to qualify for the position of assistant superintendent, superintendent, and finally manager. Or, if he is more interested in the agricultural side of the industry, he may enter field work, and should do this for at least part of his time because it prepares him better for the higher positions.

One drawback in the career of the chemist in the sugar industry is that in most countries the work is seasonal, at least for those on the lower rungs of the ladder. The beet campaign usually lasts only about two or three months. The cane harvest is also very short in some places, as for instance in Louisiana, where killing frosts may occur before all of the cane has been cut. But in most tropical countries the campaign extends over four to six months, and in a few favored localities, like in Perú, the cane may be harvested throughout the year and the factory shuts down only for a short time for necessary repairs.

The harvest season is not the same in different countries, and it is sometimes possible for a chemist to take off a beet crop or a Louisiana cane crop and then to go to the tropics for a cane campaign. But in either case there are at least several months during which time he will be idle unless he can find some other temporary work until the following campaign. If at all possible, he should take up agricultural work during that time, to get acquainted with that phase of the industry. He could be profitably employed in the analysis of soils, fertilizers, etc. Some of the beet companies in the United States employ their chemists for nematode control work during the summer. But unfortunately only a few progressive companies open their laboratories to their chemists for the off season, and the chemists themselves should convince the owners that it would pay to do so, especially to undertake research work for which there is no time during the busy grinding season.

A few adventurous men have taken advantage of the difference in grinding seasons to take a trip around the world at little expense, by saving enough at one place to go on to the next.

When the chemist attains the higher positions he is usually placed on an annual basis even in those countries where the grinding season lasts only a few months. Some of the larger beet sugar companies in the United States retain the chief chemist and one or two assistants the year round.

Although it would appear that the seasonal nature of the work for the majority of the chemists makes employment in the sugar industry not very attractive, there are nevertheless certain compensations. There is a splendid opportunity for travel, adventure, romance, and a chance to become familiar with the peoples, languages, and customs of other countries, and thus to broaden oneself culturally. It is true that in many of these places the living conditions are not what we are used to at home, but there are also many where, although different, they compare favorably with those in sugar factories in the United States.

During late years there has been a trend in some of the Latin American countries, and others as well, to restrict the number of foreign chemists, either by government regulation, or by training native sons for the work, or both. This movement has been particularly noticeable in Cuba and Puerto Rico, and under present conditions it will probably continue, so that there will be fewer opportunities for American chemists to find employment there. But the domestic industry is a very large one, and there are plenty of places in the beet sugar industry, in the expanding cane industry in Louisiana and Florida, and in the refineries.

Instead of devoting his time to work on the plantation, in the sugar factory, or refinery, the sugar chemist may also enter the service of the various institutions maintained by the government or by private associations, mainly for the purpose of experimentation and research. There are also in most countries analytical laboratories specializing in the field of sugar products, organized to facilitate commercial transactions in these products. The growers of beet seed also require the services of chemists.

There are few consultants in the sugar industrial field, probably because most sugar factories maintain their own laboratories, can readily obtain information from the government or from the institutions maintained by their associations, and also get free service from the producers of sugar machinery and factory supplies.

This discussion would not be complete without mentioning some of the chemists who have achieved prominence in the sugar industrial field. We shall confine ourselves to just a few of those now living. The nestor of such men in the United States is W. D. Horne, who served the sugar refining industry from 1886 to 1930, and who is now engaged in consulting practice. He has to his credit a number of innovations in the manufacture of raw sugar, in refining, and in analytical methods, and is best known as the orginator of Horne's "Dry Lead", the use of which has eliminated an important analytical error.

The second American to be mentioned is an educator, C. E. Coates, who was dean of the Audubon Sugar School, referred to previously, from 1908 until his retirement last year. He has sent countless graduates into practically all the cane sugar countries of the world, and is revered by them as their teacher.

C. A. Browne specialized for twenty-two years in the sugar field, first as chemist of the Louisiana Sugar Experiment Station, then as chief of the Sugar Laboratory in the Bureau of Chemistry in Washington, and finally as chemist in charge of the New York Sugar Trade Laboratory. He was then recalled to Washington as chief of the Bureau of Chemistry, and is again engaged in his original, much broader field of agricultural chemistry. His *Handbook of Sugar Analysis* is the most comprehensive treatise on the subject in existence.

Another chemist, who in his early years was connected with the Louisiana Sugar Experiment Station, is H. P. Agee. He was called from there to Hawaii, and became the director of the Experiment Station of the Hawaiian Sugar Planters' Association, which post he occupied with distinction for twenty-two years. During his regime the Station attained front rank among sugar institutions of the world, in friendly rivalry with the sugar experiment station in Java.

This leads us into foreign fields. In 1891 a young Hollander, H. C. Prinsen Geerlings, was engaged by this Java Station as a chemist, and he became director shortly afterward. He served in this capacity until 1908 when he was appointed the representative of the Java Station in Amsterdam. He is the oldest of the few men now living who have mastered all the branches of the world's sugar industry, agricultural, manufacturing, commercial, and economic. He has not only acquired this vast knowledge, but has been able to pass it on to others in numerous books and thousands of publications, written in masterful style, in Dutch, English, French or German, all of which he handles equally well.

A British counterpart of Prinsen Geerlings in Noel Deerr, who was born in England, but spent most of his life in sugar factories in Demerara, Mauritius, and Cuba, as chemist of the Hawaiian Sugar Experiment Station, as superintendent of an American refinery, and lastly as administrator of a combine of sugar factories and other agricultural enterprises in India. The recent rise in white sugar production in that country as brought about largely through Deerr's efforts. His excellent grasp of the various branches of sugar production is best shown in his book entitled *Cane Sugar*.

Among other European chemists, Claassen and von Lippmann deserve

special mention. Both are octogenarians. Claassen was until a few years ago director of a German beet sugar factory, which post he had held for forty-three years. He is the grand old man of the German sugar technologists, admired and feared for his sharp pen. His book on beet sugar manufacturer is a classic.

Von Lippmann was for thirty-seven years in charge of a sugar refinery in Germany, but like Prinsen Geerlings he is most widely known as a publicist. At the age of twenty-five he issued the first edition of his *Chemistry of the Sugars*. Although no new edition of this monumental work has appeared since 1904, it is still an indispenable reference work on the subject. Von Lippmann has also written an authoritative book on the history of sugar.

The only surviving member of a long line of famous chemists in the French sugar industry is D. Sidersky, well known for his books on sugar manufacture and factory control. In Czechoslovakia, V. Stanek has achieved distinction as director of the Research Institute for the Sugar Industry.

These are but a few of the prominent men who are serving the sugar industry in various ways. There are many others who are contributing their share, large or small, to the progress of the sugar industry and who also serve as examples to the new generation.

When, in summing up, we compare the sugar industry with other chemical industries, it would appear that the opportunities offered for material reward and for other, more imponderable advantages, are no better and no worse. The man of character, intelligence, and application, who has the fundamental training and is willing to work hard, will make his way here as well as in any other branch of chemistry or chemical engineering.

Dr. Frederick W. Zerban, author of the above article, is chemist in charge of the New York Sugar Trade Laboratory. His experience in the sugar industry has been extensive since 1904, and includes sugar experiment station work in Perú, the Argentine, Puerto Rico, and Louisiana. Many of his experiments and articles have been published in experiment station bulletins and in the technical literature.

The Interpretation of Spectrographic Analyses

By Paul H. M.-P. Brinton, F.A.I.C.

How may analytical reports be interpreted? Observations by the Head of the Department of Chemistry of the University of Southern California.

In very recent years there has been a great increase in the number of complete qualitative analyses made on samples of ore and rock gathered by prospectors. This is almost wholly due to the widespread use of the spectrograph by consulting analytical chemists and assayers. Whereas, formerly the complete qualitative analysis of a prospector's sample was either a very expensive proposition, or else it was, as frequently performed, a hit or miss sort of an affair performed for a lower fee, now with the increased adoption of the spectrograph by practical chemists and assayers, prospectors can get a complete qualitative analysis for a few dollars, and they have been quick to realize the benefits of such a test. The spectrographic investigation gives not only a full list of the elements present in a sample, but also a rough approximation of the quantities of each element. In the case of elements present in small amounts the quantitative approximations are usually fairly accurate.

During a twenty-five thousand mile trip which covered a majority of the mining districts in the United States, both in the more densely populated areas and in the remote districts where all assays and analyses have to be handled by mail, it was a matter of great interest to see how much use was being made by prospectors of the results of spectrographic analyses of their samples. But in a great many instances there was a disturbing note in the picture. Non-chemists in the mining districts (and this group comprises well over ninety-nine per cent of all prospectors, and owners of small mines) know only a comparatively small number of elements—the useful metals, precious and common, silicon, calcium, magnesium and, perhaps, sodium and potassium. These elements are apt to bound the prospector's chemical outlook on the mineral kingdom, and when he receives the report of a spectrographic analysis which shows that his piece of rock carries as many as twenty or twenty-five elements, he thinks that his sample must indeed be unusual. One widow, in her canyon home, showed me with greatest elation a list of twenty-two elements reported from a recent spectrographic analysis of ore from the prospect which her husband had spent years in developing. She regretted

exceedingly that her husband had died without ever knowing what a treasure-chest he had possessed. He had thought the ore contained only lead, zinc, and a little silver. But here was titanium, molybdenum, vanadium, gallium, barium and a host of other interesting things. Of course, she explained, they seemed to be in small amounts, but then these things were very valuable. The analysis, to an experienced chemist, represented just what the deceased husband had thought he had—a very low-grade lead and zinc ore which carried a little silver, and a not uncommon mixture of those rarer elements which the spectrograph has shown to exist in minute amounts in many common ores and rocks. It was hard to bring this poor woman down to earth.

In another instance a spectrographic analysis had revealed 0.01 per cent of germanium in an ore. The owner of the property said he had a large amount of this material. He had written to a large supply-house to get a quotation on germanium salts and metal. The results of his investigation fairly swept him off his feet. He calculated the amount of germanium on his property, and the retail price for which the finished product would sell. The calculated profits were enormous, and it was difficult to make him see the enormous cost of recovery, and the limited market for his product at the prices quoted.

These two cases have been encountered, in modified form, in every corner of the United States. Gallium is a fairly wide-spread element; titanium occurs in nearly every sample; copper can be detected in a very large number of samples, and molybdenum and vanadium are far from uncommon. In all these cases reference is made to traces. But the trouble is that the uninitiated calculate poundage from their huge dikes and deposits, and then check up on the retail price of their product. It is hard to convince these optimists that the cost of the necessary chemical operations would be utterly prohibitive. The best chance of bringing about this conviction is at the time the report is submitted, before they have had time to build air castles that are hard to tear down.

It seems, then, that there is an ethical duty which the spectrographist should perform, and that is to acquaint his inexperienced clients with the significance of the findings. It might be said that this is an old question, but the fact is that we did not report nearly so many elements in a "complete" analysis before the advent of the spectrograph, and the number of times that mistaken ideas of the value of ores has been encountered has convinced me that those who make spectrographic analyses for prospectors should be careful not to let false hopes be aroused in the minds of their clients.

Chemist Advisory Council

By W. T. Read, F.A.I.C.

(Dr. Read is acting in the absence of Dr. W. S. Landis, President, who is in Europe for several months)

PREVIOUS issues of THE CHEMIST have contained news of the organization and work of Chemist Advisory Council, Inc. Since the transfer of the Committee on Unemployment and Relief to the new organization, registration in all classifications has increased until on October first, the total is 564. These figures do not include chemists who have recently come to this country nor does it include many who have inquired regarding the work of the Council but who have not filed complete records. During the month of September there were 68 new registrations. About one half of all registrants are mature and experienced chemists who have held responsible positions for a number of years. It is significant that the offices of the Council are being visited by a larger number of unemployed chemists residing outside the metropolitan area than ever before.

In order to coördinate all efforts to help chemists seeking employment, the Council is coöperating with several groups in other cities, particularly Philadelphia, Detroit, and Chicago.

The question is naturally asked, "Why have unemployed chemists registered when there are practically no jobs for them? Are you not merely raising false hopes?" In reply it may be said that the only way a chemist can hope to find an opening, even if openings are scarce, is to meet and talk to prospective employers. When there is a change of conditions in an industry, those whose qualifications are best known are first employed. Very often chemists need information and suggestions so that they may have a better knowledge of individual chemical industries and what they manufacture. Being well informed they approach the problem with tact and confidence. This has worked well many times in the past and will continue to work. Dark as the outlook may seem now, during the month of September ten registrants informed the council that they had secured positions in the industry. Furthermore, the fact that their fellow chemists are maintaining an organization and giving unemployed chemists a place where they may receive help and advice has a tremendous effect in keeping up morale and enabling them to fight their own battles for reemployment through a planned campaign.

The chemical industry has an efficient and experienced agency in

the Council by which they may make contacts with those who have the qualifications they are seeking.

The fact that from ten to thirty individuals visit the office of the Council every day indicates that unemployed chemists find the services of this organization helpful.

The success of the old Committee on Unemployment and Relief over the six years of its existence and the fact that all of the records and experience of this organization are available to the present Council should guarantee that this valuable and necessary work will be carried on with still greater efficiency.

Various plans for permanently financing the Council are being discussed, but these depend on a broad program of publicity and education, which takes time. The Council needs immediate support to carry on its work through the next few months until it can hope to tap other sources of help. This immediate support should come from every employed chemist. If every chemist earning above $35.00 per week would contribute at least $1.00 per year and as much more as he can afford, the work of the Council can go on. Even if the Council should find large gifts later, it would mean a great deal to unemployed chemists to know that their fellow chemists were interested to the extent of giving a substantial sum to this necessary humanitarian enterprise.

If there is ever a time the chemists of the United States need to work together to help the very considerable number of able and experienced chemists who are now out of work through no fault of their own, this is the time.

Chemist Advisory Council therefore appeals to every member of THE AMERICAN INSTITUTE OF CHEMISTS to contribute to the support of the Council. Contributions may be made to the order of Chemist Advisory Council, Inc. and sent to 300 Madison Avenue, New York, N. Y.

Council Meeting

The National Council of THE AMERICAN INSTITUTE OF CHEMISTS will hold its next meeting on Monday, November 7, 1938, at The Chemists' Club, 52 East 41st Street, New York, N. Y.

Charles Holmes Herty

Chemists and non-chemists alike grieved at the death of Charles Holmes Herty, F.A.I.C., on July twenty-seventh, in Atlanta, Georgia, not far from Milledgeville, where he was born in 1867.

He was a man of singularly warm and attractive personality, who, gifted with a brilliant mind, had received superb scientific training at the University of Georgia, Johns Hopkins, Berlin, and Zurich. Science, he believed, is truly worthwhile when it is related to human affairs, and during his whole life he turned his scientific work toward the improvement of existing conditions, whether by eliminating the waste of the turpentine resources, or by working to establish the National Institute of Health, or by developing a paper industry for the South.

Certain economic conditions in the South, his beloved homeland, aroused his deep human sympathies, and for many years he labored to advance his country through chemistry, even though his ideas at first were received with indifference. More recently his accomplishments won recognition from his grateful people. Early this year he was named "the man of the year for Georgia and the South." His last ten years were devoted to developing processes to make newsprint from Southern pines, not for personal reward, but in his own words,

"so that people living in the midst of the finest paper material might not longer endure the bitterest sort of poverty. The development of this industry is going to mean the elimination of one-room houses for families; better food for those who live on corn bread and occasional meat; better clothes for those who go in rags today. The use of the Southern pine will change this." Today, it is prophesied that a billion dollar industry for the South may result from Dr. Herty's work. In January of this year, the first unit of a nine million dollar pulp mill was dedicated at Fernandina, Florida. The first newsprint mill in the South will be erected at Lufkin, Texas. The success of this industry will also mean American independence from the necessity of buying foreign newsprint.

Dr. Herty began his career by teaching chemistry at the University of Georgia from 1891 to 1902, followed by two years with the Bureau of Forestry of the United States Department of Agriculture. For eleven years he then held a professorship at the University of North Carolina. He is remembered as an inspiring teacher of charming personality.

Great as have been his labors for the South, Dr. Herty's activities have extended themselves into wider fields. He was editor of *Industrial and Engineering Chemistry* from 1917 to 1921, and president of the Synthetic Organic Chemical Manufacturers' Association for the following five years. The late President Wilson, in 1919, sent him to Paris to negotiate for the purchase of impounded German dyes, a mission which he discharged satisfactorily both for our textile industry and for our developing dyestuff industry. At the time of his death, he was director of the Pulp and Paper Laboratory of the Industrial Commission of Savannah.

Honors came to him as his work began to be recognized. He was elected president of the American Chemical Society in 1915. THE AMERICAN INSTITUTE OF CHEMISTS awarded him its medal in 1932 for "noteworthy and outstanding service to the science of chemistry and the profession of chemist in America." Two years later he was awarded the Herty Medal, named in his honor, by the American Chemical Society. The Chemical Foundation liberally supported his research program.

Dr. Herty's sincerity, honesty, and devotion to his profession have won the love and admiration of the many who knew him. More and more, as his real contributions to the country are understood, he

will be remembered as a truly great man of his age who served his people to the best of his scientific ability.

The South will love and revere his memory most of all, as its bright economic future approaches through the intelligent use of its pine forests. Perhaps the pines themselves, to slightly paraphrase the beautiful words of John H. Finley, "will make a little grove around his grave. I am sure that the pine trees would like him as their king, if kings were only popular, or perhaps as their president. This devotion will continue so long as there is a pine tree on the earth."

George Moir Johnstone Mackay

George Moir Johnstone Mackay, F.A.I.C., died on his birthday, July 29, 1938, at Speculator, New York. He was born in 1883 at Pictou, Nova Scotia, where his father was superintendent of education of the Province. He studied at Dalhousie University and obtained the M.A. degree in 1906. Then followed two years at Massachusetts Institute of Technology. After he had received the S.M. degree, he returned to Dalhousie University to teach chemistry there for one year. The next year he served as chemist for the Sydney Cement Company; and in 1910, he became research engineer under W. R. Whitney for the General Electric Company at Schenectady, New York, a position which he held until 1933. From this date until his death he was director of research for the American Cyanamid Company.

Dr. Mackay is the author of many publications in the fields of the theory of solution, incandescent lamp phenomena, electrical discharge in gases, and the chemistry and physics of electrical insulating materials. During the war, he developed methods for detecting submarines. In 1936, Dalhousie University honored him with its LL.D. degree, in recognition of his many accomplishments.

Dr. Mackay was well-liked by all who knew him. He was modest in manner, scrupulously honest, sympathetic and deeply sincere. Throughout his career, his fine spirit of coöperation won the regard and affection of his associates. He belonged to several societies, among them The American Chemical Society, National Research Council, American Physical Society, and the Nova Scotia Institute of Science.

John Jacob Abel

John Jacob Abel, Honorary Member of THE AMERICAN INSTITUTE OF CHEMISTS, died on May twenty-sixth in Baltimore, Maryland, in his eighty-first year. He was born in Cleveland, Ohio, in 1857. He was graduated from the University of Michigan, which later awarded him honorary A.M. and Sc.D. degrees. He then obtained the M.D. degree from the University of Strassburg. From 1891 until his retirement as emeritus professor of pharmacology in 1932, Dr. Abel served on the faculty of Johns Hopkins University. His contributions to the fields of pharmacology and physiological chemistry have been extensive and valuable. He was the discoverer of adrenalin, and did much work on the chemical and biological properties of insulin in crystalline form. Many honorary degrees were awarded to him. He also received the first medal of the American Research Corporation; the Willard Gibbs medal, and the medal of the Society of Apothecaries, London. He was editor of the *Journal of Pharmacology and Experimental Therapeutics* from 1909 until 1932. Dr. Abel's accomplishments are a splendid illustration of the way in which the chemist has contributed to human health and welfare.

Clarence P. Linville

Clarence P. Linville, who has been a Fellow of THE AMERICAN INSTITUTE OF CHEMISTS since 1924, died on May 25, 1938. He was born in Urbana, Ohio, March 29, 1879. The Ohio State University awarded him the B.Sc. and M.A. degrees in chemistry. Following his graduation, he spent a year as chemist with the National Steel Company and Globe Iron Company, and then became professor of metallurgy at Pennsylvania State College for nine years. The next twelve years were spent as metallurgist for the American Smelting and Refining Company. From 1924 until the time of his death he was metallurgist for the Calco Chemical Company, Bound Brook, N. J. He specialized in metallurgical and chemical process development, particularly on problems connected with the manufacture of sulfuric, nitric, and hydrochloric acids, beta naphthol, and ultramarine materials.

Among the societies to which he belonged were the American Institute of Mining and Metallurgical Engineers, the American Electrochemical Society, the American Chemical Society, and Sigma Xi.

COUNCIL

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President, Robert J. Moore
Vice-President, J. W. E. Harrisson
Secretary, Howard S. Neiman
Treasurer, Burke H. Knight

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Ross A. Baker
Frank G. Breyer
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W. T. Read
Allen Rogers
Norman A. Shepard
Maximilian Toch
Lloyd Van Doren
Gerald Wendt

CHAPTER REPRESENTATIVES

New York: W. D. Turner
Niagara: A. W. Burwell
Philadelphia: Gilbert E. Seil
Washington: Louis N. Markwood

June Meeting

The one-hundred and fifty-fourth meeting of the Council of The American Institute of Chemists was held at The Chemists' Club, 52 East 41st Street, New York, N. Y., on June 2, 1938, at six o'clock P. M.

President Robert J. Moore presided. The following officers and councilors were present: Messrs: F. G. Breyer, B. H. Knight, R. J. Moore, M. Toch, W. D. Turner. Miss V. F. Kimball was present.

In the absence of the Secretary, the President appointed Miss Kimball to act as secretary-pro-tem. The minutes of the previous meeting were accepted. The Treasurer's report, showing a bank balance of $3725.37 and liabilities of $592.34, was read and accepted.

The President spoke on current aspects of the movement to license chemists. The President appointed Dr. Toch as head of a committee to be known as the "Financial Advisory Committee", with the Treasurer as the other member. This Committee was requested to make recommendations and report them to the Council.

Dr. Read reported for the Committee on Membership. Upon motion made and seconded, Dr. Read was reappointed chairman of the Committee on Membership with the privilege of selecting the other members of this committee.

Plans for establishing a Chapter of the Institute in Chicago were discussed.

After discussion of the work and plans of The Chemist Advisory Council, Mr. Breyer was appointed to take up the matter of contributions to the Advisory Council with Mr. W. W. Winship. Dr. Toch agreed to investigate the securing of an appropriation of Federal funds to employ chemists on research projects.

The following new members were elected:

FELLOWS

Abraham J. Nydick
(1938), *Patent Attorney*, 1421 Chestnut Street, Philadelphia, Penna.

William D. Ramage
(1938), *Consulting Chemist*, 130 Bush Street, San Francisco, Calif.

ASSOCIATE

Luciano L. Blancaflor
(A.1938), *Chemist*, E. J. Lavino & Company, Plymouth Meeting, Mo. County, Penna.

Myles R. Freese
(S.1938), Commercial Department, Queens Borough Gas and Electric Company, Lynbrook, N. Y.

A letter regarding proceedings of the Council from the Niagara Chapter, was read and the Secretary was requested to send copies of this letter to each of the councilors for consideration before the next meeting, which will be held in October.

The President announced that Dr. Elmer Kraemer, who is abroad on a fellowship, will submit a report on the legal status of chemists in Europe.

Upon motion made and seconded, the President appointed a committee to prepare a resolution, to be adopted by the Council, regarding the licensing of chemists. Dr. J. W. E. Harrisson was appointed chairman of this committee, which includes the following members: F. G. Breyer, Lloyd Van Doren, Raymond E. Kirk, F. D. Snell, W. D. Turner, R. C. Benner, and Howard W. Post. The Committee was instructed to prepare a well-thought-out resolution carrying a preamble explaining why this resolution was adopted, and to present this at the October meeting of the Council.

Upon motion made and seconded, a vote of thanks was given to the Treasurer for his work.

There being no further business, adjournment was taken.

CHAPTERS

New York

Chairman, Frederick Kenney *Vice-chairman*, Frederick W. Zerban

Secretary-treasurer, D. H. Jackson
17 John Street
New York, N. Y.

Council Representative, W. D. Turner

Pennsylvania

Chairman, George Russell Bancroft *Vice-Chairman*, Walter L. Obold

Secretary-treasurer, Harry C. Winter
4742 Pine Street
Philadelphia, Penna.

Council Representative, Gilbert E. Seil

Niagara

Chairman, William R. Sheridan *Vice-chairman*, Maurice C. Taylor

Secretary-treasurer, Carl H. Rasch
1212 Oliver Street
North Tonawanda, N. Y.

News Reporter to THE CHEMIST, W. A. Smith

Washington

Honorary President, Charles E. Munroe *President*, Frank O. Lundstrom
Vice-President, Albin H. Warth *Treasurer*, Joseph J. Stubbs
Secretary, A. P. Bradshaw
2121 New York Avenue, Washington, D. C.

News Reporter to THE CHEMIST, James F. Couch
Council Representative, Louis N. Markwood

Report of Meetings

IN FEBRUARY a luncheon was held on the fourteenth; and the third business meeting of the year was held on the twenty-fourth. The guest speaker for the luncheon was Mr. J. S. Robb of the American Air Lines. Mr. Robb gave a very interesting account of the part chemists had played in the development of aluminum and its alloys and the use of aluminum alloys in the construction of better airplanes. He also discussed some of the modern safety devices in planes of today.

On Wednesday, March tenth, the Chapter visited the Washington Air Port. Mr. J. S. Robb of the American Air Lines had arranged a very interesting trip with several guides to show the group through the buildings. It was seen how, by means of radio dispatches, the Bureau of Air Commerce sets the course of the plane and keeps track of the planes in their flight. Field dispatchers in the towers give permission to land and say how the plane is to land. In a separate building, the Weather Bureau makes six hour forecasts of weather conditions from which the advisability of the flight may be determined.

The last luncheon of the year was held in April at the U. S. Department of Agriculture. Our speaker on this occasion was Mr. David J. Guy, engineer of natural resources of the U. S. Chamber of Commerce. He gave a short talk on the advantages and disadvantages of Government owned sources of power such as the Tennessee Valley Authority and Boulder Dam. He stressed two points: (1) Short term leases of the Government have not been attractive to industry, thus these sections have not been populated as rapidly as might have been hoped for from an economic viewpoint. (2) Sometimes it is cheaper to lose power than it is to try to recover it. Industry should look to coal for its power. A short discussion followed Mr. Guy's very informative talk.

On May thirteenth the Chapter held its annual Baltimore Meeting. It began with a trip in the afternoon through the plant of the Maryland Glass Corporation, which the members found most interesting and enjoyable. After the trip some of the group met at the Hotel Emerson for dinner, which was followed by dancing. Both the dinner and the music for the dancing were of the best. Those present were indeed grateful to Mr. N. W. Mathews, our Vice-president, through whose efforts the afternoon and evening entertainments were arranged.

The final business meeting of the year was held on Friday, May twenty-seventh, at the Wardman Park Hotel, President Markwood presiding. A brief review of the years' activities was given by the President, followed by a short discussion by the members. The annual election of officers was then held with the following results: Honorary President, C. E. Munroe; President, F. O. Lundstrom; Vice-president, A. H. Warth; Secretary, A. P. Bradshaw; and Treasurer, J. J. Stubbs.

BOOKS

TEXTBOOK OF ORGANIC CHEMISTRY, by George Holmes Richter, Assistant Professor of Organic Chemistry, The Rice Institute, *John Wiley and Sons, Inc.*, New York, 1938. viii + 711. 14.8 x 22.9 cm. $4.00.

The author's justification for presenting this book is that many of the texts in organic chemistry now available "are not suitable for instruction of students who are entering the various branches of science as a career. For the instruction of such students one cannot turn to advanced textbooks for aid, since they presuppose some introductory training in the field. . . .

"This book is directed specifically to that large body of ambitious students who wish to study beginning organic chemistry and gain more than a superficial knowledge of the subject. To accomplish this end the material is so arranged that the emphasis falls on the fundamentals of the science, namely, nomenclature, synthesis, reactions, and properties. . . .

"The electronic theory of valence has not been unduly emphasized, not that it is unimportant, but rather that it is best adapted to a more advanced exposition where it may be set forth in proper perspective with the collateral information of mathematics and physics. In the light of modern physics this theory seems to be more complex than was formerly supposed, and since there is some disagreement over certain phases, it seems wise to avoid an extensive discussion in an elementary treatise on organic chemistry. . .

"The amount of material covered in this book is, perhaps, more than can be covered in the average one year course, yet this is to the best advantage of the student."

Four hundred and fifty-six pages are devoted to the chemistry of the aliphatic series under the following chapter headings: Introduction, saturated hydrocarbons, unsaturated hydrocarbons (olefins), acetylene hydrocarbons, alcohols, ethers, aldehydes and ketones, monobasic acids (and geometrical isomerism), halogen derivatives (and the Grignard reaction), acyl halides and acid anhydrides, esters and oils and fats and waxes, acid amides, cyanides and nitro compounds, amines,

compounds of sulfur, polybasic acids, halogenated acids and hydroxy acids and optical isomerism, aldehydes and ketonic acids (and tautomerism), ureides and purine derivatives, carbohydrates, and amino acids and proteins. The aromatic series are allotted one hundred and ninety pages under the chapters: aromatic compounds, chemistry of the simple aromatic hydrocarbons, aryl amines, phenols and amino phenols, aromatic arsenic derivatives, aromatic alcohols and aldehydes and ketones, aromatic acids, polynuclear aromatic compounds, and coal-tar dyes. Thirty-four pages are devoted to the heterocyclic series under the chapters heterocyclic systems and alkaloids. Thirty-one pages are utilized for the index, which contains about 3,000 entries.

Eighty-four tables are used advantageously to furnish the student with a large amount of physical data and factual information, and seventeen figures aid in the clarification of certain concepts.

Graphic formulas and graphic equations are used freely throughout the book. Bars are used, except in the rather limited discussions of electronic structure, to illustrate valence bonds. The space devoted to structure and electronic configuration may be adequate, however, for the scope that the book is designed to cover. Adequate space is given likewise, in keeping with the objective of the book, to the mathematical developments and the physiochemical aspects of organic chemistry.

At the close of each chapter, except the introduction, is a set of problems which are designed to aid the student in his mastery of the basic principles of the chemistry of the homologous series just considered.

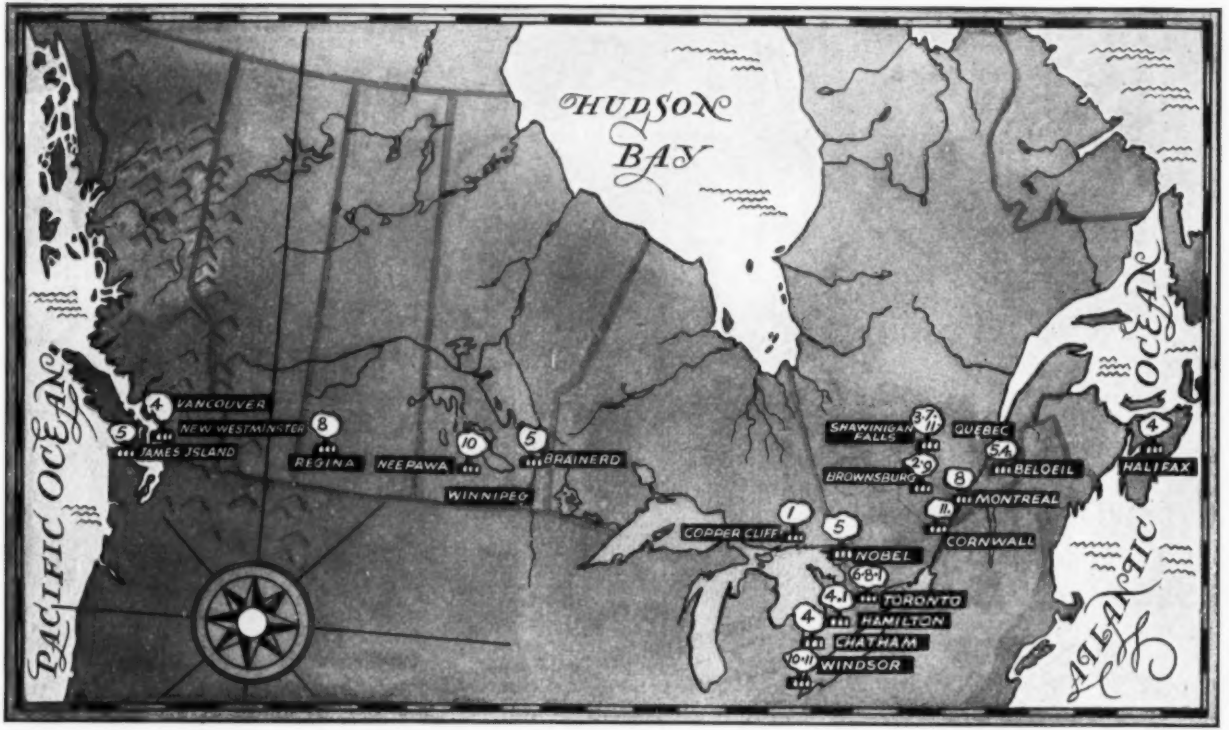
The reviewer feels that this book, in the words of the author, should "help to acquaint the student with the fundamental problems and essential conceptions of organic chemistry, to describe how this body of knowledge was acquired and to create a belief in its inherent value, and finally, to direct attention to the basic facts and problems of this branch of science which are related to other types of knowledge."

ED. F. DEGERING, F.A.I.C.

The second edition, revised and enlarged, of *Hackh's Chemical Dictionary* has recently been published. The author, Ingo W. D. Hackh, F.A.I.C., states that writing this dictionary is a task which is never finished, and that since the new issue, he has already accumulated a large number of additional entries in order to keep the book up-to-date.

J. P. Lawrie, formerly editor of *The Manufacturing Chemist* (*London*), is now in partnership with Mr. H. T. F. Rhodes in the production of a new journal, *Chemical Products* (*London*). Its policy is to cover a wide field with emphasis upon the light industries, stressing new uses for chemical products, new outlets for them, and their future in British industry. Special subscription rates are offered members of THE AMERICAN INSTITUTE OF CHEMISTS.

THE CHEMIST invites contributions of professional articles, news items, or other material of interest to its readers.



Canada's Coördinated Chemical Industries

(1) General Sales Division. (2) "Dominion" Ammunition Division. (3) "Cellophane" Division. (4) Fertilizer Division. (5) Explosives Division. (6) "Fabrikoid" Division. (7) Organic Chemicals Division. (8) Paint and Varnish Division. (9) Plastics Division. (10) Salt Division. (11) Alkali Division. All are part of or affiliated with Canadian Industries Limited.

NORTHERN LIGHTS

***By* Howard W. Post, F.A.I.C.**

Apparently the impression once existed in the councils of the British Empire that the acquisition of Canada in 1763 at the close of the French and Indian War was chiefly of value in depriving the French of something. This was perhaps a perfectly natural point of view at a time when there was war for at least a century between these two great nations with very few interludes of peace to serve as breathing spells. It was a point of view moreover which was shared by American colonials of the period. It was a period of commercial rivalry to the death, and on this side of the Atlantic painted savages tomahawked, scalped, and burned at the bidding of officers, English, French and, it must be admitted, American. But as the years of the nineteenth century slipped by there came a fuller appreciation of the value of Canada, first as a group of British colonies, then as a federated unit, and finally as a member of the British Commonwealth of Nations and a unit in the political and economic order of the day.

An editorial in *Canadian Chemistry and Process Industries* **22** 178 (1938) classifies Canada as a nation "with resources and peoples skilled enough to engage in finished product manufacture" which is just beginning to discover its powers. There seems to be very little competition in the home market as far as chemicals are concerned. Each example of this type of product will be found to be handled by one organization. This organization is usually under extra-Canadian control. Naturally enough no provision is made under this set up for export trade. But there is a brisk export trade and it is carried on by the other type of Canadian chemical manufacturing organization—the type which is Canadian owned and controlled. This is the sort of chemical business for which the editor feels there is a decided future.

A recent editorial in *Canadian Chemistry and Process Industries* **22** 359 (1938) expresses an opinion which many of us have long held but which we have never seen in print. This opinion concerned itself with the advances in medical research which are before us today. It seems that in Canada, as in the United States, medical research is laying before public and practitioners information and remedies of which the investigators even of yesterday did not even dream. And yet to what extent is the world really indebted to doctors of medicine for the digging out of this information, for its assembling, and for its presentation to the world? This is a phase of the practice of medicine which lies entirely outside the scope of activities of the practitioner. In the last analysis, it is the chemist or the medical man who has temporarily shifted to chemistry who has presented these milestones of progress to humanity. This is as it should be, but on the other hand credit should be given where credit is due. More than one medical college in this country, and we suppose in Canada as well, is indebted for the greater part of its pure research to chemists, physiologists, and

(9) Plastics Division. (10) Salt Division. (11) Alkali Division. All are part of or affiliated with Canadian Industries Limited.

similarly trained staff members rather than to doctors of medicine. Let some responsible organization come forward now and tell this story to the public —tell our lay brethren the story of medical advances in terms of chemistry.

In an "average" year, Canadian chemical industry turns out products to the value of $125,000,000, including allied items using a capital investment of $150,000,000 and the services of 20,000 persons. In addition there are some 1500 plants using chemical processes with an annual production, also for an "average" year, of some $800,000,000 in value. Estimates of the amount of horsepower available in Canada run as high as 43,000,000 of which not quite twenty per cent is in use at the present time.

Our folks in Washington were not unaware of the recent visit of the Society of Chemical Industry to Canada. Secretary Hull issued instructions to the effect that these English and Canadian visitors were to be permitted the privilege of crossing the line at will and without hindrance and in the words of one writer "this group . . . dashed back and forth across the Line literally without knowing it existed."

Biochemical Research Grant Renewed at the University of Pittsburgh

The Buhl Foundation grant for research in biochemistry has been renewed for the college year 1938-39 for studies of vitamin C, tissue respiration, and molecular structure, in the Department of Chemistry of the University of Pittsburgh. The following are the appointees under the renewed grant: Max O. Schultze, Ph.D. Wisconsin, Research Fellow on animal nutrition and tissue respiration; Rade R. Musulin, Ph.D. Pittsburgh, Research Fellow on animal nutrition; Herbert E. Longenecker, Ph.D. Pennsylvania State College, Research Fellow on the molecular structure of fats; Carter J. Harrer, B.S. Pittsburgh, Research Assistant on tissue respiration; Theodore H. Clarke, B.S. Chem. Pittsburgh, Research Assistant on the molecular structure of fats and sugars; Mary L. Dodds, B.S. Chem. and M.S. Pittsburgh, Research Assistant on tissue respiration. The studies on heats of combustion in relation to molecular structure will be under the supervision of Dr. Gebhard Stegeman, Professor of Physical Chemistry. Dr. Charles Glen King, F.A.I.C., Professor of Biological Chemistry, is Director of the general project.

Corning Glass Works announce that their new "Pyrex" brand laboratory catalog LP-18 is being distributed. It contains 128 pages, and carries 2,353 individual items, of which over 700 are listed for the first time. They inform us that prices are reduced on more than five hundred items.

Robert J. Moore, F.A.I.C., was recently elected to honorary membership in the Chemical, Metallurgical and Mining Society of South Africa, at Johannesburg.

CHEMISTS ABROAD

By James N. Taylor, F.A.I.C.

MR. B. Wilson Haigh, M.L.A., M.I.Chem.E., has been elected a member of the Bihar Legislative Assembly, India, and Mrs. Wilson Haigh has been presented with the King's Coronation Medal at the hands of the Governor of the Province, Sir Maurice Hallet, according to an announcement in *Chemistry and Industry, London.*

CHARLES E. MUNROE, Honorary Member of THE AMERICAN INSTITUTE OF CHEMISTS, when chief chemist of the Explosives Division of the United States Bureau of Mines, prepared a manuscript bibliography of the literature of explosives, which has just been made available in the form of microfilm by the Bureau of Mines of the U. S. Department of the Interior. This bibliography covers practically all the important journals prior to 1907, when *Chemical Abstracts* began. Dr. Munroe retired from the active service of the Bureau of Mines before he could provide the work with author and subject indices. Research workers, patent attorneys, and others who may be interested in the historical development of the science and technology of the explosives industry will find this bibliography very helpful. Copies on microfilm may be obtained from the American Documentation Institute, care of Science Service, 2101 Constitution Avenue, N.W., Washington, D. C., if specified as Document No. 1137, mentioning at the same time the name of the author and the subject matter.

AMONG those who attended the International Congress of Pure and Applied Chemistry held in Rome in May was Mr. H. E. Hill, chemist of the Western Australian department of mines.—*Chemical Engineering and Mining Review.* (Australia).

IMPERIAL Chemical Industries, Ltd., announce that Mr. H. J. Mitchell, for reasons of health, has relinquished the office of president of the company. He will remain as director. Major Freeth, research manager, has also retired but he will continue his connection with the company in the capacity of consultant.—*The Oil and Colour Trades Journal* (*London*).

EVIDENTLY those who use chemistry in related fields find it difficult to define the terms they employ, according to the following editorial from *Combustion,* (*New York*):

"Engineers are accustomed to employ certain rules and symbols in the routine solution of their problems. Although fully conversant with the use of such terms and possessing a general knowledge of their significance, it is believed that many would falter if called upon to define them. One such term which is in daily use in power plant work is pH value. We all know, of course, that this relates to hydrogen ion concentration, and that pH=7 represents the neutral point,

values above or below which designate alkaline or acid conditions, respectively. But just why is this so?

"This appears to be answered very clearly in an unidentified clipping from some dentists' circular or paper which was recently handed to the editor. It has the following to say about pH:

'As is most generally known, the symbol pH with a number written after it, represents the concentration of the hydrogen ion in a given solution. But what is not generally known, is the fact that this same symbol is simply an abbreviation of the term "*inverse* logarithm of the hydrogen ion concentration." In other words, the lower the pH of a solution, the greater is its acidity.

'For example—by actual experiment, we find that a given solution dissociates into ions to the degree of one part in ten thousand. We therefore express the dissociation as (H) 1/10,000 or $1/10^4$, and by taking advantage of a simple rule of exponents 10^{-4}. Now the logarithm of the last number is (—4), but to simplify it, we use the inverse logarithm (the symbol of which is "p" and we may now express the hydrogen ion concentration as p(H) 4.

'The reverse is true of alkaline solutions. They possess a lesser relative amount of hydrogen ions and therefore the inverse logarithm representing the dissociation, will be greater. For example—the dissociation of a given solution is found to be one part in one hundred million. In other words, (H) is equal to 1/100,000,000 or $1/10^8$ or 10^{-8} or p(H) 8. The dissociation of pure water is one part in ten million and so its pH is 7. This is considered the point of neutrality.'"

CHEMISTS

Walter S. Ritchie, F.A.I.C., was re-elected grand collegiate alchemist of Alpha Chi Sigma Fraternity at its recent Fifteenth Biennial Conclave held in New Orleans, Louisiana. Dr. Ritchie is head of the Chemistry Department of Massachusetts State College. Amherst, Massachusetts.

Winfield Scott Hubbard, F.A.I.C., has joined the staff of The Drug Products Company, Inc., Long Island City, New York, as director of production, control, and research. Dr. Hubbard received the Ph.D. degree in Chemistry and Pharmacy from the University of Wisconsin. He has held several responsible positions in the food and drug fields.

C. A. Elvehjem, F.A.I.C., will speak on "The Biochemistry of the Water Soluble Vitamins" before a meeting of the Pittsburgh Section of the American Chemical Society on October twentieth.

Isabel R. Whelan, F.A.I.C., and Ernest P. Tibbitts were married on September fourteenth at Our Lady of Christians Church, East Orange, N. J. Miss Whelan received the master's degree in chemistry from Columbia University, and was assistant research director of Bristol-Myers Company at Hillside, N. J. Mr. Tibbitts is a graduate of Brooklyn Polytechnic Institute. He is a chemical engineer and a member of Sigma Chi Alpha fraternity.

Clifford S. Leonard, F.A.I.C., for the past ten years a director of research in the pharmaceutical industry, has been appointed assistant professor of pharmacology at the College of Medicine, University of Vermont, Burlington, Vermont.

Glass Center at N. Y. World's Fair to Depict History of Industry

The colorful three-century history of glass making in America and the graphic story of its uses in the future will be depicted at the New York World's Fair, 1939.

Three of the country's leading glass manufacturers, Corning Glass Works, Owens-Illinois Glass Company, and Pittsburgh Plate Glass Company, will coöperate in a joint exhibit, housed in a unique building known as Glass Center.

Two outstanding features of Glass Center, in addition to the multitudinous displays of the individual companies, will be a molten glass furnace in actual operation and a glass fibre making machine that will produce the latest development of the glass industry, the drawing of glass into "yarn" for fabrics.

Designed by Shreve, Lamb, and Harmon, New York architects, the Glass Center building proper will occupy an area of twenty-five thousand square feet, describing a huge semicircle over the fifty-seven thousand square feet on which Glass, Incorporated, the joint exhibiting company, will build. In contrast to many other Fair buildings, Glass Center is being constructed primarily of glass block, plate glass and structural glass. The important position occupied by glass in modern construction will be exemplified fully in the erection of Glass Center.

Practical Patent Law Course

Chemists, research workers, and technicians to whom a practical knowledge of patent law and procedure is desirable in connection with their professional work will have the opportunity to obtain the necessary information and background in this field by attending the course on Patent Law offered by the Practicing Law Institute.

The course is conducted by Edward Thomas, a registered patent attorney and author of *Law of Chemical Patents* and other books on patent law, and is not only designed to give an understanding of the legal concepts and terminology which grow out of the peculiar nature of property in inventions, when protected by the patent law, but also covers the many practical legal problems in protecting inventions and in their commercial exploitation.

Coöperating with Mr. Thomas as lecturers will be William J. Navin of the patent division of the Western Electric Co. and others. The fee for the course, which consists of ten two-hour lectures, is $20. The lectures will be given at the Engineering Societies Building, 29 West 39th Street, New York City, on Mondays from eight to ten p. m. commencing October third. The class will be limited in size so as to permit round table discussion.

Further information may be obtained from the Practicing Law Institute, 150 Broadway, New York, N. P.

J. Fitch King, F.A.I.C., chairman of the Department of Chemistry at Williams College, Williamstown, Massachusetts, spent the past nine months doing research work at Kaiser Wilhelm Institut für Chemie in Berlin.

EMPLOYMENT

Chemists Available

ORGANIC CHEMIST, F.A.I.C., Ph.D. in synthetic organic chemistry; age 27, experienced in microchemistry. Industrial research experience. Now employed assistant instructor in Eastern university; seeking industrial research position or permanent teaching position with opportunity for research. Member of Sigma Xi, Phi Lambda Upsilon; location immaterial; available immediately. Please reply to Box 91, THE CHEMIST.

CHEMIST, M.S. degree, age 37, desires position in laboratory or classroom. Experienced in both analytical work and teaching. Steel, rubber, heavy chemicals. As teacher would prefer small junior college. Please reply to Box 93, THE CHEMIST.

SENIOR RESEARCH CHEMIST, F.A.I.C., wishes position. A.B. and Ch.E. degrees. Age 37. Thirteen years' experience in asphalt, non-ferrous metals, and all phases of petroleum refining and research. Please reply to Box 99, THE CHEMIST.

INDUSTRIAL CHEMIST. Position wanted by F.A.I.C. Twenty-two years' experience in industrial research and plant operation; individual work and supervision. Specialties: dyes, pharmaceuticals, intermediates, vitamins, both water and oil soluble. Plant design and construction. Ph.D. from leading American University. Member American Institute of Chemical Engineers. Organic and biological chemistry. Please reply to Box 95, THE CHEMIST.

GERMAN PROFESSOR (Catholic) wishes position. Doctor of Technology degree. Age 36. Ten years' teaching experience and research in Germany. Speaks English. Please reply to Box 97, THE CHEMIST.

CHEMIST, J.A.I.C., B.S. in Chem. 1938. Knowledge of organic and inorganic analysis. Thesis in organic analysis. Desires position with possibility of research in analytical methods. Please reply to Box 99A, THE CHEMIST.

Positions Offered

CHEMIST with electroplating experience, particularly silver plate on steel. Location New Jersey. Please reply to Box 94, THE CHEMIST.

CHEMIST experienced in printing inks, particularly formulation of tin printing litho offset inks. Some sales service work. Please reply to Box 96, THE CHEMIST.

CHEMIST with broad experience in the manufacture of dry colors. Salary $2900. Please reply to Box 98, THE CHEMIST.

BIOLOGICAL CHEMIST to take charge of manufacture of biological products, with several years of experience. Salary open. Please reply to Box 98A, THE CHEMIST.

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